Exhibit 4

UNITED STATES DISTRICT COURT FOR THE SOUTHERN DISTRICT OF NEW YORK

Master File No. 1:00-1898

MDL NO. 1358 (SAS)

Commonwealth of Pennsylvania, etc. v. Exxon Mobil Corporation, et al,

Docket No. 1:14-cv-06228-SAS

EXPERT REPORT OF SCOTT CARR, PH.D.

May 24, 2021

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Contents

This report sets forth the conclusions I have reached in this proceeding.[2] To summarize, I have reached five primary conclusions based on the data and documents I have reviewed, the configuration of the U.S. refined products production and distribution network, limitations on the degree of commingling occurring within that network, the multiple geographic and product markets in Pennsylvania, the variety of gasoline products used in the U.S. and Pennsylvania, industry changes over time, commercial and operational considerations related to ethanol usage, and other factors discussed herein:

1. Contrary to Mr. Burke's numerous references to "the Pennsylvania market," Pennsylvania comprises numerous distinct markets, including distinct "geographic markets," that are supplied by different combinations of industry participants (e.g., refiners, wholesalers, terminal owners/operators, traders, and jobbers) and gasoline transportation alternatives (pipelines, rail, barges, and trucks) and/or that use different types of gasoline.
2. Mr. Burke's opinions regarding the distribution of MTBE gasoline in PADD[3] 1 and Pennsylvania[4] are overly generalized to the point of being incorrect. That is, while Mr. Burke's opinions may apply to some firms in some locations in PADD 1 (which covers the entire East Coast of the United States, from Maine to Florida) at some points in time, they

[2] Materials I considered in preparing this report are listed in Exhibit 2 or otherwise noted in this report. Exhibit 3 is a list of the firms that engaged me in this matter.

[3] "The Petroleum Administration for Defense Districts (PADDs) are geographic aggregations of the 50 States and the District of Columbia into five districts: PADD 1 is the East Coast, PADD 2 the Midwest, PADD 3 the Gulf Coast, PADD 4 the Rocky Mountain Region, and PADD 5 the West Coast." EIA, "PADD regions enable regional analysis of petroleum product supply and movements," February 7, 2012, https://www.eia.gov/todayinenergy/detail.php?id=4890. PADD 1 is divided into three sub-regions: PADD 1A (New England), PADD 1B (Central Atlantic, including Pennsylvania), and PADD 1C (Lower Atlantic).

[4] Expert Report of Bruce F. Burke, March 8, 2021 (*hereafter*, Burke Report), ¶ 127.

network effects, customer acceptance, ethanol supply and price, blendstock supply, reauthorization of governmental ethanol subsidies, exchanges, market concentration in the ethanol industry, contracting and counterparties, and availability of ethanol-specific infrastructure, facilities, and equipment.

5. In complex production and distribution systems, major changes, especially if they entail significant investment, complexity, and risk, are not commercially viable without some form of mandate – typically, regulatory, financial, or operational – that induces the involved firms to individually choose to participate in the change. In the early 1990s, there was no mandate sufficient to lead gasoline industry participants to implement widespread ethanol usage in the U.S. Northeast. Consequently, widespread ethanol usage in that area was not commercially viable and did not occur. It only occurred when State restrictions on MTBE usage beginning in 2004[6] and the Renewable Fuels Standard enacted in 2005 created a regulatory mandate for ethanol usage. Therefore, it is unreasonable to believe that widespread ethanol usage could have happened in the U.S. Northeast in the early 1990s.

II. Overview of the U.S. Gasoline Supply Chain

The U.S. gasoline supply chain is an extensive high-volume production and transportation network that begins with crude oil production and ends with the delivery of gasoline to retail stations. Crude oil is produced in a variety of regions in the U.S., or it is imported from other

[6] New York and Connecticut banned MTBE in 2004, the first states in the U.S. Northeast to do so. Iowa was the first state nationwide to restrict MTBE with a partial ban effective in 2000. EPA, "Regulatory Determinations Support Document for CCL 2," June 2008, https://www.epa.gov/sites/production/files/2014-09/documents/chapter_13_mtbe.pdf, p. 13-59.

countries. It is transported by pipeline, waterborne transportation, and rail from production areas to refineries, where it is processed into "refined products" such as gasoline, diesel fuel, and jet fuel.[7] From the refineries, gasoline is transported, primarily by pipeline or waterborne transportation, to bulk terminals in the markets where the gasoline is consumed.[8] Additionally, refineries typically have bulk terminals or "truck racks" attached from which gasoline is dispensed directly into tanker trucks for local distribution. At the bulk terminals, the gasoline is blended with additives and ethanol (when it is used). Figure 1 below depicts the U.S. gasoline supply chain visually, and the Subsections that follow describe it in more detail.

[7] When referring to "gasoline" in this report, I refer to a variety of gasoline products including MTBE-blend gasoline and gasoline blendstock.

[8] In addition to gasoline, products like diesel fuel and jet fuel can be received and distributed by bulk terminals.

oil is the Louisiana Offshore Oil Port (LOOP), which can unload extremely large crude oil tankers and connects to crude oil pipelines.[23]

C. Crude Oil Refining

U.S. crude oil refining capacity is concentrated in several areas, especially along the U.S. Gulf Coast, though individual refineries are scattered throughout the country. Exhibit 6 depicts refinery capacity around the country as of 1995 at which time the U.S. had, according to the United States Department of Energy's Energy Information Administration ("EIA"),[24] 175 operable refineries with combined capacity of 15,434 thousand barrels per day ("MBD") located as follows:

- 65 refineries with combined capacity of 7,011 MBD along the Gulf Coast,
- 43 refineries with combined capacity of 2,897 MBD on the West Coast,
- 34 refineries with combined capacity of 3,447 MBD in the Midwest,
- 18 refineries with combined capacity of 1,572 MBD on the East Coast, and

[23] DOE, "QER Report: Energy Transmission, Storage, and Distribution Infrastructure, Appendix A: Liquid Fuels," April 2015, https://www.energy.gov/sites/prod/files/2015/07/f24/QER_Appendix%20A_LiquidFuels.pdf, p. LF-34.

[24] "The U.S. Energy Information Administration (EIA) collects, analyzes, and disseminates independent and impartial energy information to promote sound policymaking, efficient markets, and public understanding of energy and its interaction with the economy and the environment." EIA, "About EIA," https://www.eia.gov/about/.

- 15 refineries with combined capacity of 508 MBD in the Rocky Mountain region.[25]

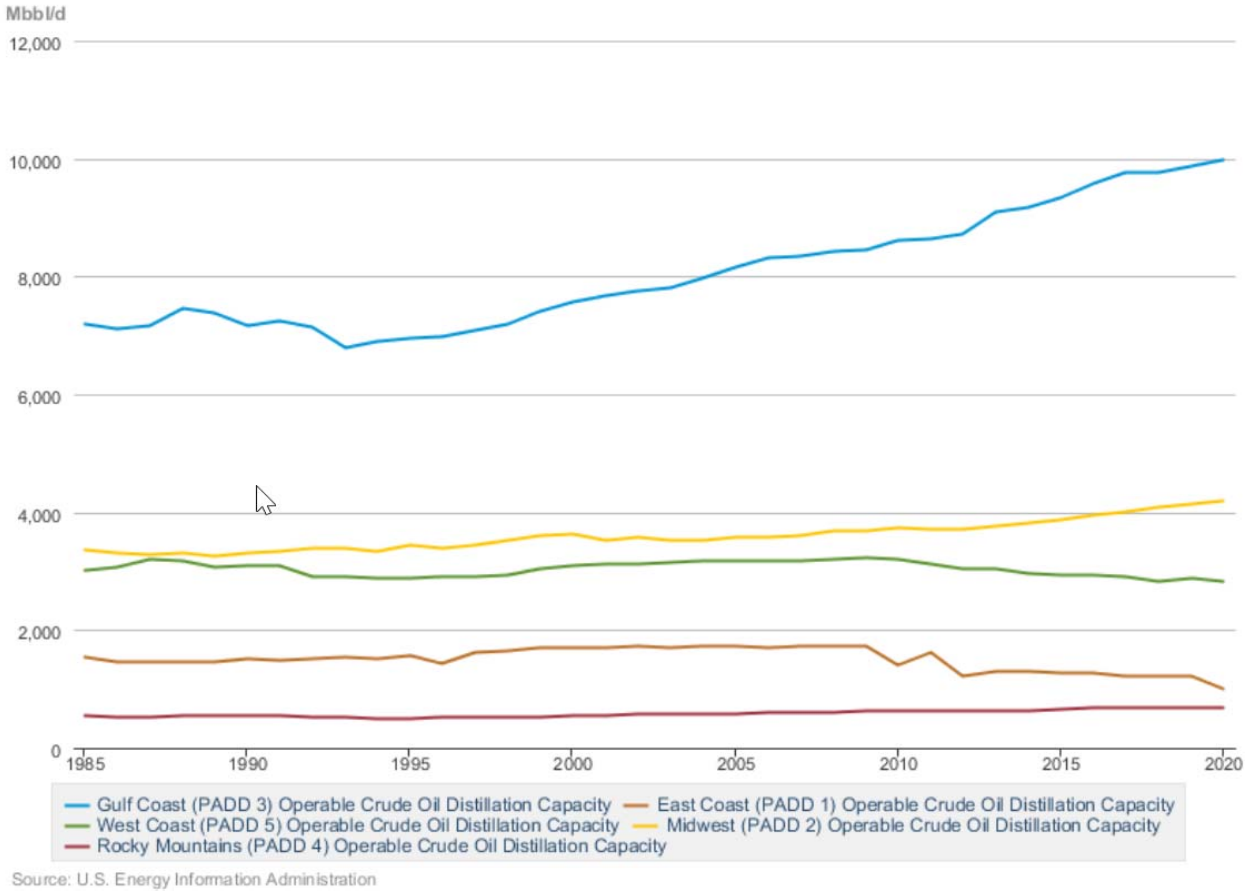
By state, Texas (4,004 MBD) and Louisiana (2,384 MBD) had the most refining capacity, followed by California (1,910 MBD), Illinois (1,002 MBD),[26] and Pennsylvania (748 MBD).[27] Figure 4 depicts historic operable refining capacity over time by region.

[25] EIA, "Number and Capacity of Petroleum Refineries," https://www.eia.gov/dnav/pet/pet_pnp_cap1_a_(na)_8O0_Count_a.htm; EIA, "Number and Capacity of Petroleum Refineries," https://www.eia.gov/dnav/pet/pet_pnp_cap1_a_(na)_8D0_BpCD_a.htm.

[26] *Ibid*.

[27] *Ibid*.

Figure 4
Operable Refining Capacity by Region[28]



D. Refined Products Transportation

Refined products pipelines – which carry gasoline and other refined products such as diesel fuel and jet fuel – connect refineries to most areas of the country. Exhibit 7 shows the major U.S. refined products pipelines.

[28] EIA, "Refinery Utilization and Capacity," https://www.eia.gov/dnav/pet/pet_pnp_unc_a_(na)_YRL_mbblpd_a.htm; EIA, "Operable Crude Oil Distillation Capacity, Annual," https://www.eia.gov/opendata/embed.php?type=chart&series_id=PET.MOCLEP32.A;PET.MOCLEP12.A;PET.MOCLEP52.A;PET.MOCLEP22.A;PET.MOCLEP42.A&date_mode=all.

Hundreds of ports in the U.S. can handle crude oil and/or refined products. For example, as of 2014, the U.S. Army Corps of Engineers identified 68 U.S. ports handling crude oil, 42 of which were in the U.S. Gulf Coast (PADD III).[29] Meanwhile, 266 ports in the U.S., of which 52 were in the Gulf Coast, handled refined products.[30] While the U.S. Gulf Coast contained the majority of crude oil ports, the other regions had many more ports handling refined products than crude oil – with 114 such ports in the East Coast, 42 in the Midwest (i.e. along rivers), and 58 in the West Coast.[31]

E. Relevant Principles of Operation

Several basic principles applicable to the handling of gasoline throughout the gasoline supply chain are relevant to my analysis. The first principle, "segregation," is the separation (non-mixing) of different gasoline types throughout the supply chain. Additionally, in some cases, individual firms will keep their gasoline volumes separated from other firms' volumes. Segregation is necessary to maintain the specifications and economic value of the different gasoline types.

When gasoline is stored, segregation is maintained by placing different gasoline types in separate or "segregated" tankage. Segregated tankage is used to "buffer" or "decouple" different stages of the gasoline supply chain while maintaining the desired separation of

[29] Intek Inc., "United States Fuel Resiliency – Volume I," September 2014, https://www.energy.gov/sites/prod/files/2015/04/f22/QER%20Analysis%20-%20United%20States%20Fuel%20Resiliency%20Volume%20I.pdf, p. 51.

[30] *Ibid.*

[31] *Ibid.*

gasoline types. For example, without segregated tankage between a refinery and a pipeline, the pipeline would have to transport whatever gasoline products the refinery was producing at exactly the rate the refinery was producing them. With segregated tankage, the pipeline has the flexibility to optimize its transportation schedule by scheduling different types of gasoline in a more economically and operationally efficient manner. Another example of segregated tankage is "breakout tankage" located within pipeline systems and controlled by the pipeline operator. Breakout tankage is typically used at points in a pipeline system where the pipeline's flow is interrupted, such as where the pipeline's diameter changes or where volumes are added to or removed from the pipeline's flow.

The second principle of operation is "batching" which is the transportation of gasoline through pipelines as a sequence of batches that are moved sequentially through the pipeline. Batching enables segregation within pipelines without necessitating a separate dedicated pipeline for each gasoline type.

The third principle of operation is "standardization." The industry has largely adopted standardized minimum specifications for a finite number of distinct types of gasoline based on chemical and physical properties. Gasoline volumes of the same type – *i.e.,* that meet the same standardized specifications – are "fungible," meaning that volumes can be mixed without compromising those specifications.[32] Standardization promotes economic efficiency because it

[32] Declaration of James Simnick, December 22, 2015, P 27 ("The term 'fungible' has a discreet [sic] and limited meaning in the oil transportation industry. Fungible means that the quality of a particular batch of fuel meets minimum agreed-upon specifications, and may be mixed with similar fuels (of the same type, octane grade, and

reduces the number of discrete products that must be segregated and facilitates trading between industry participants. Standardization reduces tankage requirements because it limits the number of different tanks that are needed. And, in the case of pipelines, standardization reduces the number of discrete products that must be segregated in batches and allows for increased batch sizes. For example, Colonial Pipeline, the largest refined products pipeline in the U.S., accepts 28 standard types of gasoline and 36 standard types of distillate, a category of refined products that includes diesel fuel and fuel oil.[33] However, the gasoline supply chain is not fully standardized, and some products, including products produced by Defendants during the relevant period, are not fungible.

The fourth principle of operation is "commingling" which is the "mixing of two petroleum products with similar specifications."[34] At points within the gasoline supply chain, shipments of fungible volumes (*i.e.,* volumes that meet the same standardized specifications) may be commingled and transported in the same batch or stored in the same tank. Once commingled, the mixture cannot be separated again into its constituent volumes.

RVP class) made by other refiners for shipment and use. In fact, specifications for the different grades and kinds of gasoline may even vary somewhat from pipeline to pipeline, so that a 'fungible' batch on one pipeline may not always be 'fungible' with a batch of the 'same' octane and type on another pipeline.").

[33] Colonial Pipeline Company, "Section 3 Product Codes and Specifications," January 1, 2021, https://colpipe.s3-us-west-1.amazonaws.com/media/COLONIAL-PRODUCT-SPECIFICATION-JANUARY-2021-Revision.pdf?mtime=20210103130835&focal=none, pp. 3-5.

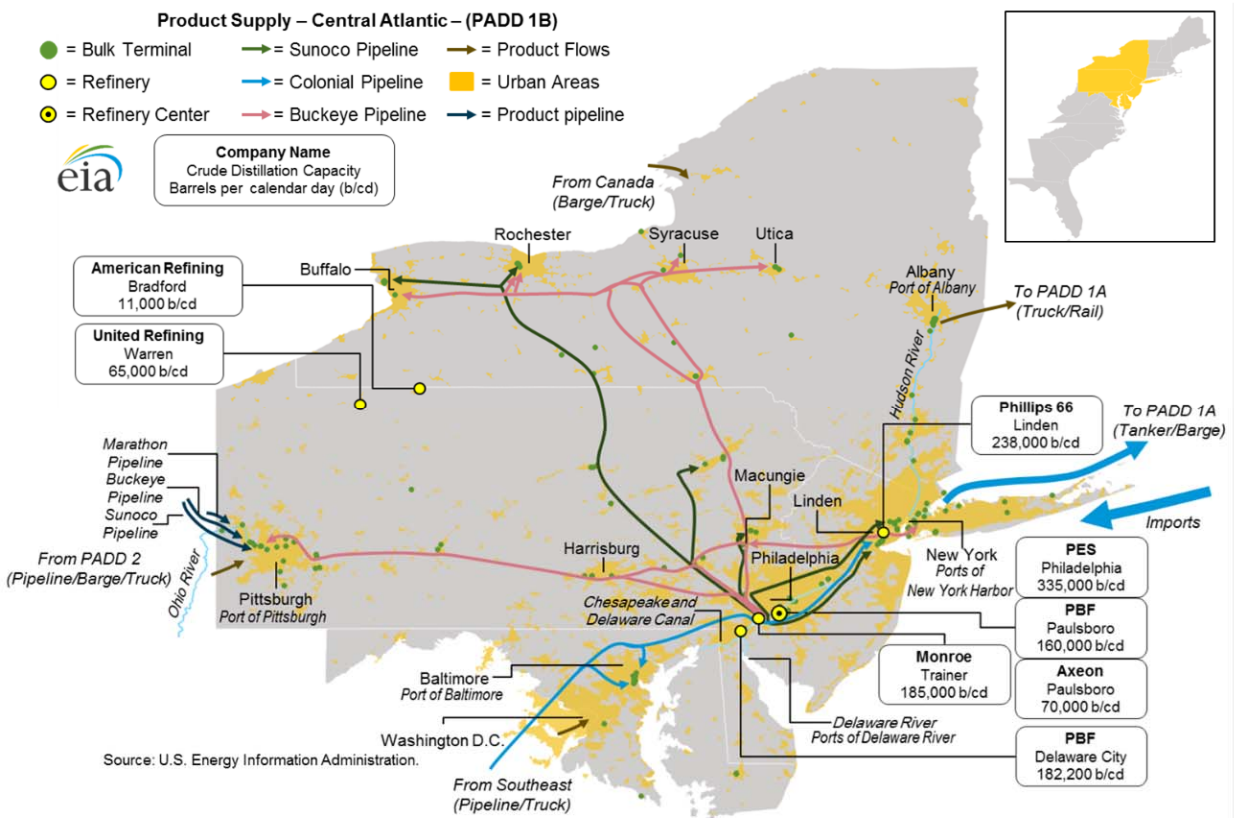
[34] OPIS, "Glossary of Terms," https://www.opisnet.com/resources/glossary-of-terms/.

III. The Gasoline Supply Chain Serving the Markets in Pennsylvania

Figure 5 is a visual overview of the gasoline supply chain in and around Pennsylvania. The gasoline supply chain serving Pennsylvania's market includes refineries in Southeast and Northwest Pennsylvania;[35] pipelines entering the state from the south, east, and west; waterborne transportation from the west (Ohio River) and east (Atlantic seaboard); and tanker trucks bringing gasoline into the state from all directions (not shown in Figure 5). This supply chain is explained in more detail in the following Subsections. Additionally, it should be noted that Figure 5 depicts the gasoline supply chain in and around Pennsylvania at one point in time, 2016, so it does not depict all of the pipelines and refineries, or the ownership of the pipelines and refineries that are depicted, at other points in time.

[35] In Figure 5, refinery capacities are expressed as "b/cd" which stands for "barrels per calendar day."

Figure 5
Overview of the Gasoline Supply Chain In and Around Pennsylvania, 2016[36]



A. Pennsylvania Gasoline Consumption

The EIA provides data on U.S. energy production, by refinery, and consumption, by state.[37] Exhibit 8 shows gasoline consumption for the years 1980 through 2006 in Pennsylvania and in the U.S. East Coast (PADD 1).[38]

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[36] ICF International, "East Coast and Gulf Coast Transportation Fuels Markets," prepared for the EIA, February 2016, https://www.eia.gov/analysis/transportationfuels/padd1n3/pdf/transportation_fuels_padd1n3.pdf, Figure 22.

[37] "The State Energy Data System (SEDS) is the source of the U.S. Energy Information Administration's (EIA) comprehensive state energy statistics. EIA's goal in maintaining SEDS is to create historical time series of energy production, consumption, prices, and expenditures by state that are defined as consistently as possible over time

B. Key Regulatory Milestones

Different areas of Pennsylvania have been subject to different gasoline regulations that varied over time. First, the Oxygenated Gasoline Program beginning November 1992 required the sale of oxygenated gasoline in certain areas, including the Philadelphia area, based on those areas' 1988/1989 carbon monoxide levels.[39] Second, regulations mandated the sale of "Reformulated Gasoline" ("RFG") in the Philadelphia area as well as much of New England and the Mid-Atlantic region. RFG is "gasoline blended to burn more cleanly than conventional gasoline and to reduce smog-forming and toxic pollutants in the air."[40] The RFG program was part of the 1990 Clean Air Act amendments, which required the sale of RFG in cities with high smog levels.[41] Phase I of the RFG program began in 1995, and a more stringent Phase II began in 2000.[42] Third, the 1990 Clean Air Act amendments also set Reid Vapor Pressure (RVP, a measure of a liquid's propensity

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and across sectors for analysis and forecasting purposes." EIA, "About SEDS," https://www.eia.gov/state/seds/. Volumes include fuel ethanol and denaturant beginning in 1993.

[38] EIA, "State Energy Data System (SEDS): 1960-2018 (complete)," https://www.eia.gov/state/seds/seds-data-complete.php?sid=US#Consumption.

[39] EIA, "Areas Participating in the Oxygenated Gasoline Program," July 1, 1999, https://www.eia.gov/outlooks/steo/special/pdf/oxy2.pdf, p. 2.

[40] EPA, "Gasoline Standards, Reformulated Gasoline," https://www.epa.gov/gasoline-standards/reformulated-gasoline.

[41] *Ibid*.

[42] EPA, "Gasoline Standards, Reformulated Gasoline," https://www.epa.gov/gasoline-standards/reformulated-gasoline; EIA, "Areas Participating in the Reformulated Gasoline Program," July 1, 1999, https://www.eia.gov/outlooks/steo/special/pdf/rfg2.pdf.

to evaporate) limits of 9.0 in some areas and 7.8 in other areas, such as the Pittsburgh area, based on ozone levels.[43]

The timeline in Figure 6 below shows key milestones for RVP, Oxygenate, and RFG Regulations applying to Pennsylvania. As indicated in the figure, the RFG regulations were mandatory for the Philadelphia region. Additionally, in 1991, the Pennsylvania Governor initially requested portions of the remainder of the state be opted into the RFG program. However, in December 1994, just one month before the regulations took effect, the Governor reversed course, and requested those areas be opted out.[44] EPA issued a waiver, so the RFG regulations did not take effect in those areas, but EPA did not formally approve the opt-out request until 1996. Also, the Pittsburgh area was subject to an RVP 7.8 requirement starting in 1998,[45] while the rest of Pennsylvania was subject to an RVP 9.0 requirement.[46] The Philadelphia area was included in the Oxygenated Gasoline Program in winter 1992 before meeting air quality standards and leaving the program in 1996.

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[43] EPA, "Gasoline Standards, Gasoline Reid Vapor Pressure," https://www.epa.gov/gasoline-standards/gasoline-reid-vapor-pressure; EPA, "Approval and Promulgation of Air Quality Implementation Plans; Pennsylvania; Removal of Allegheny County Requirements Applicable to Gasoline Volatility in the Allegheny County Portion of the Pittsburgh-Beaver Valley Area," July 5, 2019, https://www.federalregister.gov/documents/2019/07/05/2019-14258/approval-and-promulgation-of-air-quality-implementation-plans-pennsylvania-removal-of-allegheny.

[44] Associated Petroleum Industries of Pennsylvania News Release, "Oil Industry Responds to Reformulated Gasoline Opt-Out," December 2, 1994.

[45] Federal Register, "Approval and Promulgation of Air Quality Implementation Plans; Pennsylvania; Gasoline Volatility Requirements for the Pittsburgh-Beaver Valley Ozone Nonattainment Area," 63 Fed. Reg., 31,116, June 8, 1998, https://www.govinfo.gov/content/pkg/FR-1998-06-08/pdf/98-15023.pdf.

[46] The RVP requirement for the Pittsburgh area is no longer in place as of July 5, 2019. EPA, "Gasoline Standards, Gasoline Reid Vapor Pressure," https://www.epa.gov/gasoline-standards/gasoline-reid-vapor-pressure. The RVP requirements mentioned above are restrictions that the gasoline sold in the area cannot have an RVP value greater than the value indicated.

Figure 6
Key Milestones for Gasoline Regulations in Pennsylvania

Effective Date	Event	Pennsylvania Counties Affected
November 15, 1991	Governor requests for Non-RFG areas of Pennsylvania to be opted into the RFG program	Adams, Allegheny, Armstrong, Beaver, Berks, Blair, Butler, Cambria, Carbon, Columbia, Cumberland, Dauphin, Erie, Fayette, Lackawanna, Lancaster, Lebanon, Lehigh, Luzerne, Mercer, Monroe, Northampton, Perry, Somerset, Washington, Westmoreland, Wyoming, York
May 1, 1992	Pennsylvania other than Pittsburgh area subject to EPA 9.0 RVP requirement	Counties Other Than Allegheny, Armstrong, Beaver, Butler, Fayette, Washington, Westmoreland
November 1, 1992	Philadelphia-Wilmington-Trenton, PA-MD-NJ CMSA included in the oxygenated gasoline program	Bucks, Chester, Delaware, Montgomery, Philadelphia
December 1, 1994	Governor requests for Non-RFG areas of Pennsylvania to be opted out of the RFG program	Adams, Allegheny, Armstrong, Beaver, Berks, Blair, Butler, Cambria, Carbon, Columbia, Cumberland, Dauphin, Erie, Fayette, Lackawanna, Lancaster, Lebanon, Lehigh, Luzerne, Mercer, Monroe, Northampton, Perry, Somerset, Washington, Westmoreland, Wyoming, York
January 1, 1995	Philadelphia Control Area mandated to sell RFG	Bucks, Chester, Delaware, Montgomery, Philadelphia
January 1, 1995	The RFG requirements did not take effect due to EPA's issuance of a waiver pending a final decision in response to the Governor's opt-out request. The EPA issued a final rule staying application of the RFG regulations for certain opt in areas on 12/29/1994 (published in Federal Register on January 11, 1995 at 60 FR 2696). That stay lasted from 1/1/95 until 7/1/95. That stay was extended by publication in the FR on 7/10/95 (60 FR 35488) until final decision by EPA.	Adams, Allegheny, Armstrong, Beaver, Berks, Blair, Butler, Cambria, Carbon, Columbia, Cumberland, Dauphin, Erie, Fayette, Lackawanna, Lancaster, Lebanon, Lehigh, Luzerne, Mercer, Monroe, Northampton, Perry, Somerset, Washington, Westmoreland, Wyoming, York
March 15, 1996	Philadelphia County, PA designated in attainment of the carbon monoxide standard (no longer part of the oxygenated gasoline program)	Bucks, Chester, Delaware, Montgomery, Philadelphia
August 7, 1996	Non-RFG areas of Pennsylvania were formally opted out of the RFG program	Adams, Allegheny, Armstrong, Beaver, Berks, Blair, Butler, Cambria, Carbon, Columbia, Cumberland, Dauphin, Erie, Fayette, Lackawanna, Lancaster, Lebanon, Lehigh, Luzerne, Mercer, Monroe, Northampton, Perry, Somerset, Washington, Westmoreland, Wyoming, York
June 8, 1998	Pittsburgh area subject to EPA 7.8 summer RVP requirement	Allegheny, Armstrong, Beaver, Butler, Fayette, Washington, Westmoreland

Sources:
EIA, *Areas Participating in the Oxygenated Gasoline Program*, July 1, 1999 (https://www.eia.gov/outlooks/steo/special/pdf/oxy2.pdf).
EIA, *Areas Participating in the Reformulated Gasoline Program*, June 15, 1999 (https://www.eia.gov/outlooks/steo/special/pdf/rfg2.pdf).
EIA, *Environmental Regulations and Changes in Petroleum Refining Operations*, November 1, 1999 (https://www.eia.gov/outlooks/steo/special/pdf/enviro.pdf).
EPA, Final Rule Outlining Reformulated Gasoline Program Opt-Out Procedures and Finalization of Specific Opt-Out Requests from Maine, New York, and Pennsylvania, June 21, 1996 (https://www.epa.gov/sites/production/files/2015-08/documents/optoutfs.pdf).
EPA, Gasoline Standards, Gasoline Reid Vapor Pressure (https://www.epa.gov/gasoline-standards/gasoline-reid-vapor-pressure).
EPA, Gasoline Standards, Reformulated Gasoline (https://www.epa.gov/gasoline-standards/reformulated-gasoline).
EPA, *Overview: The Clean Air Amendments of 1990* (https://www.epa.gov/clean-air-act-overview/1990-clean-air-act-amendment-summary).
Federal Register, 56 FR 57986, November 15, 1991 (https://www.govinfo.gov/content/pkg/FR-1991-11-15/pdf/FR-1991-11-15.pdf).
Federal Register, 61 FR 2926, January 30, 1996 (https://www.govinfo.gov/content/pkg/FR-1996-01-30/pdf/FR-1996-01-30.pdf).
Federal Register, 61 FR 35673, July 8, 1996 (https://www.govinfo.gov/content/pkg/FR-1996-07-08/pdf/FR-1996-07-08.pdf).
Federal Register, Environmental Protection Agency, 40 CFR Part 52 [EPA–R03–OAR–2018–0277; FRL–9979– 44—Region 3] Approval and Promulgation of Air Quality Implementation Plans; Pennsylvania; Removal of Department of Environmental Protection Gasoline Volatility Requirements for the Pittsburgh-Beaver Valley Area (https://www.federalregister.gov/documents/2018/06/15/2018-12703/approval-and-promulgation-of-air-quality-implementation-plans-pennsylvania-removal-of-department-of).

C. Refineries in Pennsylvania and Adjacent States

Exhibit 9, in two parts, provides information about the crude oil refineries in Pennsylvania and adjacent states from 1979 through 2006 as reported by the EIA. Exhibit 9A depicts the total number and capacity of these refineries. The total number of refineries declined between the mid-1980s and mid-2000s, but average refinery capacity expanded such that overall refining

capacity grew between the mid-1980s and mid-2000s. Exhibit 9B depicts the evolving ownership of these refineries, and it indicates that the ownership of most of these refineries changed over the period shown.[47]

D. More Distant Refineries

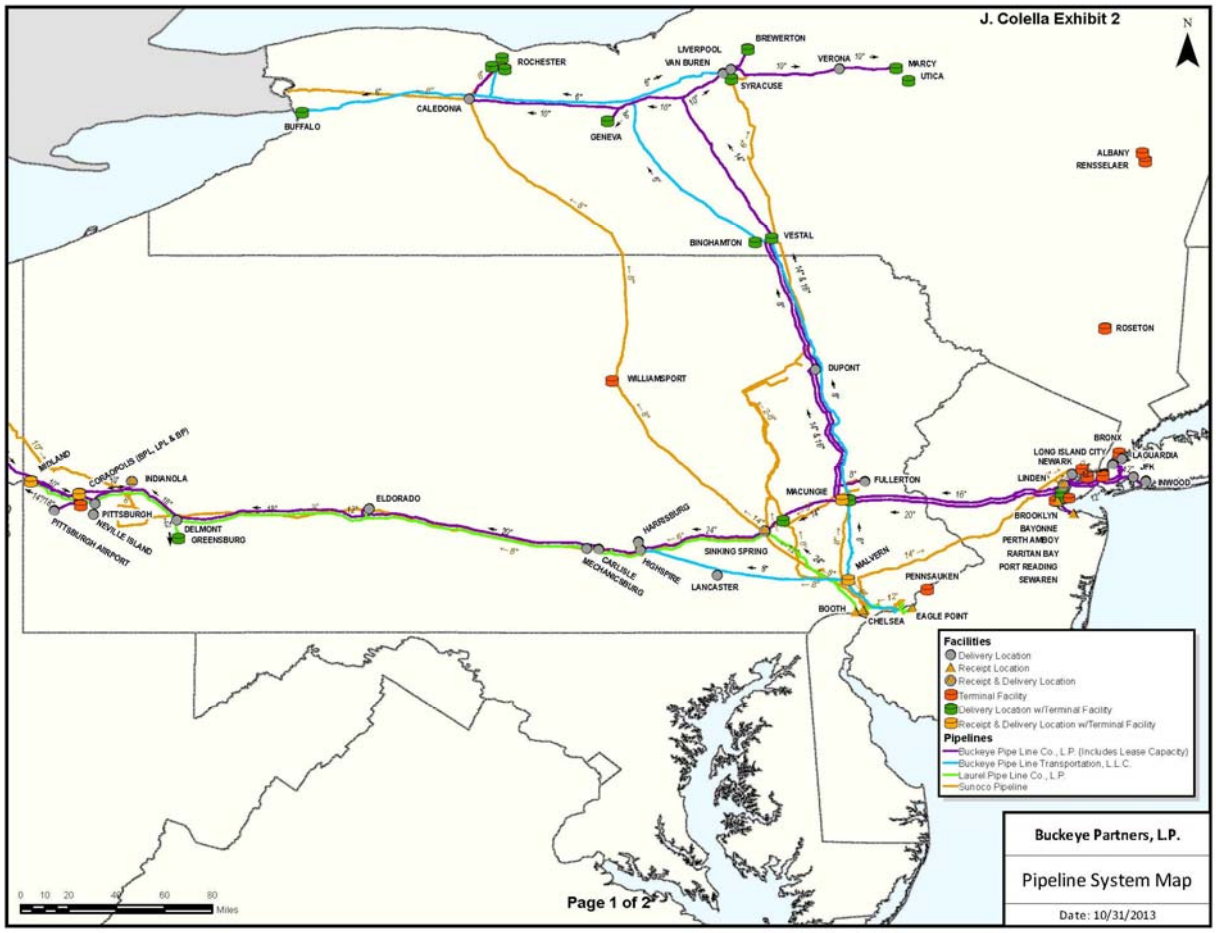
Bulk terminals in Pennsylvania also receive volumes from refineries outside of Pennsylvania and adjacent states – particularly from regions with significant refining capacity, the largest of which is the U.S. Gulf Coast. Exhibit 10 depicts the number and capacity of operable refineries in the U.S. Gulf Coast (PADD 3) for 1982 to 2006. The number of these refineries in the Gulf Coast declined over this period, and capacity declined from the mid-1980s to mid-1990s and then increased through the mid-2000s.

E. Major Refined Product Pipelines Transporting Volumes Into and Within Pennsylvania

Figure 7 is a map showing the major refined products pipelines serving the Pennsylvania markets as of 2013. The pipeline systems as of 2013 are very similar to those earlier in the 1990s and 2000s. The only significant changes are in ownership and name changes. These pipelines are discussed individually below.

[47] In addition to the refineries shown in Exhibit 9, there were refineries producing lubricants and asphalt that also produced gasoline and/or other fuels. For instance, a Pennzoil refinery in Rouseville, Pennsylvania, that closed in 2001 and an American Refining Group refinery, in Bradford, Pennsylvania, that is still operating.

Figure 7
Pennsylvania Pipelines[48]



[48] Affidavit of Joseph Colella on Behalf of Buckeye Pipe Line, L.P., Exhibit 2 in FERC Docket No. OR14-4, November 4, 2013.

Buckeye Pipeline System

The Buckeye Partners pipeline system in Pennsylvania and New York/New Jersey comprises three pipeline systems: the Buckeye Pipe Line system, the Buckeye Pipe Line Transportation system acquired from ExxonMobil in 2005, and the Laurel Pipe Line system, acquired in 1986. [49]

The Buckeye Pipe Line Company, L.P. system, shown in purple in Figure 7 above, comprises 825 miles of pipeline serving major population centers in Pennsylvania, New York, and New Jersey.[50] It receives volumes from 17 major source points from New York area pipelines, refineries, and off the water, at Linden, NJ before moving west across two pipelines to Macungie, PA.[51] From Macungie, the Buckeye Pipeline system continues west to Pittsburgh, PA, and north through Eastern Pennsylvania into New York.[52] Refined products received at Linden, NJ also move east to terminals at Long Island City, NY and Inwood, NY, and to the three major airports in the area: Newark, JFK, and LaGuardia.[53]

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[49] *See* Buckeye Partners L.P., "Organizational History," https://www.buckeye.com/AboutUs/OrganizationalHistory/tabid/108/Default.aspx;

Buckeye Press Release, "Buckeye Partners, L.P. to Acquire Northeast Pipelines and Terminals from ExxonMobil," January 20, 2005, https://www.carlyle.com/media-room/news-release-archive/buckeye-partners-lp-acquire-northeast-pipelines-and-terminals; and Buckeye Partners, L.P., "Master Limited Partner Conference," February 2005, https://www.buckeye.com/Portals/0/News%20Releases/2005/MLPConference2-28-05.pdf, p. 18.

[50] Buckeye Partners, L.P., 2018 Annual Report, p. 4. The Buckeye system in Pennsylvania as it was configured in the early 2010s is described in the Affidavit of Joseph Colella on Behalf of Buckeye Pipe Line, L.P., Exhibit 2 in FERC Docket No. OR14-4, November 4, 2013, PP 5-11.

[51] Buckeye Partners, L.P., 2018 Annual Report, p. 4.

[52] *Ibid*.

[53] *Ibid*.

The Buckeye Pipe Line Transportation system, shown in blue in Figure 7 above, is a 420-mile pipeline system that originates at the Paulsboro refinery in Paulsboro, NJ, and delivers to destinations in New Jersey, Pennsylvania, and upstate New York via a pipeline segment heading north from Malvern, Pennsylvania.[54]

The Laurel Pipe Line system, shown in green in Figure 7 above, originates near Philadelphia, PA where it receives refined products from local refineries, other pipelines and off the water. Laurel extends west from Philadelphia across 350 miles of pipeline toward Pittsburgh.

Delaware Pipeline

The Delaware Pipeline (not shown in Figure 7 above) is currently owned and operated by PBF Energy Inc. which acquired the Delaware City, DE refinery and its related assets, including the Delaware Pipeline, from Valero Energy in June 2010.[55] The Delaware Pipeline is a 23.4 mile long, 125 MBD pipeline running north from the Delaware City refinery to a connection with the Sunoco pipeline at Twin Oaks in Delaware County, PA.[56] From Twin Oaks, refined products can be moved on Sunoco Logistics' northeast pipeline systems serving Western Pennsylvania and

[54] *Ibid*.

[55] PBF Energy Inc., 2012 Form 10-K, p. 4.

[56] *See* PBF Energy, "Logistics," https://www.pbfenergy.com/logistics/. *See also*, PBF Logistics LP, Investor Presentation, June 2017, p. 17.

New York.[57] Refined products can also be transported to Chelsea, PA via Sunoco Logistics' connection with Buckeye's Laurel pipeline at Twin Oaks.[58]

Sunoco Pipeline

The Sunoco pipeline, shown in yellow in Figure 7 above, transports refined products west from the Philadelphia area (Montello, PA) to the Pittsburgh area,[59] and makes deliveries at Mechanicsburg, PA near Harrisburg and Altoona, PA near State College, PA.[60] Sunoco also has a pipeline from the west that runs from the Toledo, OH area to the Pittsburgh area.[61] Another segment of the Sunoco pipeline system runs from the Philadelphia area and makes deliveries north of Harrisburg at Williamsport, PA and Northumberland, PA before continuing to upstate New York. [62]

Sunoco also has a pipeline starting in the Philadelphia area at Montello which runs to Tamaqua, PA and Kingston, PA near Scranton.[63] North of Philadelphia, a Sunoco pipeline from Booth, PA in the Philadelphia area runs to Macungie, PA and Fullerton, PA near Allentown, PA. [64]

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[57] PBF Logistics LP, Form 8-K, May 2015, Item 1.01.

[58] *See* Affidavit of Joseph Colella on Behalf of Buckeye Pipe Line, L.P., Exhibit 2 in FERC Docket No. OR14-4, November 4, 2013, P 14.

[59] *See* Sunoco Pipeline, L.P. Application for Authority to Charge Market-Based Rates, FERC Docket No. OR05-7, April 12, 2005, p. C-10.

[60] *Id*., p. C-2.

[61] *Ibid*.

[62] *Id*., p. A-12.

[63] *Id*., pp. A-15, C-3.

[64] *Id*., p. C-8.

Marathon Pipeline

Marathon Pipeline LLC owns the East Sparta-Midland 8" Products pipeline (not shown in Figure 7 above), a refined products pipeline supplying Western Pennsylvania. The pipeline runs from East Sparta, OH to Midland, PA near the Pennsylvania/Ohio border.[65] The East Sparta to Midland line is connected to Marathon Petroleum's Canton, OH and Catlettsburg, KY refineries.[66]

Marathon Petroleum Company, which became a standalone refining, marketing and transportation company in 2011, formed MPLX LP, a midstream master limited partnership in 2012, which owns Marathon Pipeline LLC.[67] Prior to this, Marathon, then known as Marathon Oil, was part of a joint venture with Ashland Inc. called Marathon Ashland Petroleum LLC from 1998 through 2011.[68]

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[65] *See* Marathon Pipe Line LLC, "Operations," https://www.marathonpipeline.com/Operations/ and Ohio River Pipe Line LLC F.E.R.C. No. 76.23.0, effective July 1, 2020; Marathon Petroleum Company, "Our History," https://www.marathonpetroleum.com/About/History/#1953.

[66] *See* MPLX Energy Logistics, "Wells Fargo 2014 Energy Symposium Conference," December 10, 2014, https://www.mplx.com/content/documents/mplx/investor_center/Wells_Fargo_MPLX%20Dec_2014.pdf, pp. 28 and 41.

[67] Marathon Petroleum, "The Marathon Petroleum Story," https://www.marathonpetroleum.com/About/History/#1953.

[68] *Ibid*.

Colonial Pipeline

Colonial pipeline (not shown in Figure 7 above) is a 2.5 million barrel per day (2,500 MBD) refined products pipeline spanning over 5,500 miles from Houston, TX to Linden, NJ.[69] Colonial receives refined products at Gulf Coast locations at Houston, TX, Beaumont-Port Arthur, TX, Lake Charles, LA, Krotz Springs, LA, Baton Rouge, LA, Collins, MS, and Moundville, AL.[70] Colonial also currently receives refined products on the East Coast at receipt points in New Jersey (Paulsboro, Carteret, and Sewaren), and Booth, PA.[71] Colonial has delivery points throughout the southeastern U.S., in the Washington, DC area at Fairfax, VA, in the Baltimore, MD area at Baltimore and Curtis Bay, MD, in the Philadelphia area at Booth, PA, Fort Mifflin, PA, Girard Point, PA, Point Breeze, PA, Pennsauken, NJ, Trenton, NJ, and Woodbury, NJ, and in the New York City area at Linden, NJ, Newark, NJ, and Gulfport, NY.[72]

Plantation Pipeline

Plantation pipeline (not shown in Figure 7 above) has been operated and partially owned by Kinder Morgan since 2000.[73] The approximately 700 MBD refined products pipeline spans 3,180 miles through the southeastern U.S., and originates in Louisiana and terminates in the

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[69] Colonial Pipeline, "System Map," https://www.colpipe.com/about-us/our-company/system-map. *See also* Colonial Pipeline, "Frequently Asked Questions," https://www.colpipe.com/about-us/faqs.

[70] *See* Colonial, "System Map" https://www.colpipe.com/about-us/our-company/system-map; and Colonial Pipeline Company, F.E.R.C. No. 99.60.0, effective July 24, 2020.

[71] *See* Colonial Pipeline Company, FERC 99.66.0, effective April 15, 2021, p. 7.

[72] *See* Colonial Pipeline Company, FERC 99.66.0, effective April 15, 2021, pp. 4-7.

[73] Kinder Morgan, "Products Pipelines," https://www.kindermorgan.com/Operations/Products/Index.

Washington, DC area.[74] Plantation receives refined products from refinery centers at Baton Rouge, LA, Pascagoula, MS, and Collins, MS.[75] Plantation has delivery points throughout the southeastern U.S. and in the Washington, DC area at Newington, VA. The Federal Energy Regulatory Commission Plantation recently indicated that the pipeline is a supplier to the southern portion of the market surrounding Harrisburg, PA.[76]

F. Waterborne Imports

Pennsylvania has two significant ports that receive waterborne shipments of gasoline: Philadelphia Harbor and the Port of Pittsburgh.[77] Exhibit 11 shows gasoline receipts from 1984 through 2006, compiled from data collected by the U.S. Army Corps of Engineers ("Army Corps") for these ports. Gasoline receipts through Philadelphia Harbor show a downward trend through 1997 followed by an upward trend though 2006. Gasoline receipts at the Port of

[74] *See* Kinder Morgan, "Plantation Pipe Line Company (PPL)," https://web.archive.org/web/20181225180110/https://www.kindermorgan.com/business/products_pipelines/plantation.aspx and Plantation Pipe Line Company, F.E.R.C. No. 155.27.0, effective July 1, 2020; *see also* Kinder Morgan, "Products Pipelines," https://www.kindermorgan.com/Operations/Products/Index.

[75] *Ibid*.

[76] "The Commission affirms the Presiding Judge's determination of competitive alternatives in the Harrisburg destination market. The competitive alternatives [to Buckeye pipeline] include the Colonial, Sunoco, and Plantation pipelines." Guttman Energy, Inc., d/b/a, Guttman Oil Company, PBF Holding Company, LLC v. Buckeye Pipe Line Company, L.P., Laurel Pipe Line Company, L.P., Opinion No. 558, Order on Initial Decision 161 FERC ¶ 61,180 (2017).

[77] The U.S. Army Corps of Engineers defines Philadelphia Harbor as a 23-mile section of the Delaware River from below the mouth of Schuylkill River which flows into the Delaware River to the upper limit of the City of Philadelphia. Philadelphia Harbor also includes an 8.4-mile section of the Schuylkill River. The Army Corps defines the Port of Pittsburgh as a 40-mile section of the Ohio River from Pittsburgh to the Pennsylvania/Ohio State Line. The Port of Pittsburgh also includes a 72-mile section of the Allegheny River beginning at Pittsburgh and a 91-mile section of the Monongahela River beginning at Pittsburgh. Army Corps of Engineers, "Waterborne Commerce of the United States, Calendar Year 1994, Part 1 Waterways and Harbors, Atlantic Coast," https://publibrary.planusace.us/#/series/Waterborne%20Commerce%20of%20the%20United%20States.

Pittsburgh show a general downward trend with short-lived upticks in 1986, 1990, 1994, and 1998.

G. Locations of Pennsylvania Bulk Terminals

Bulk terminals that receive and distribute gasoline and other refined products are scattered in and around Pennsylvania and are concentrated near population centers, primarily Philadelphia, Pittsburgh, and Harrisburg. Exhibit 12 shows the locations of bulk terminals in and near Pennsylvania.

Most bulk terminals receive products from one or more pipelines and/or from waterborne transportation. For example: (1) a bulk terminal owned by Buckeye Terminals, LLC located in Coraopolis, PA (near Pittsburgh) can receive refined products from Buckeye Pipeline, Laurel Pipeline, and Ohio River barges;[78] (2) a bulk terminal owned by Marathon Petroleum in Midland, PA (near the Ohio border) can receive refined products from Buckeye Pipeline, Laurel Pipeline, and Marathon Pipeline, but not waterborne transportation;[79] and (3) a bulk terminal owned by Buckeye Pipeline in Tuckerton, PA (between Harrisburg and Philadelphia) can receive

[78] Guttman Energy, Inc., d/b/a Guttman Oil Company, and PBF Holding Company LLC v. Buckeye Pipe Line Company, L.P. and Laurel Pipe Line Company, L.P., Docket Nos. OR14-4-000, OR14-4-001, Exhibits GP-98 and GP-117; S&P Global, "Buckeye's Laurel oil product pipeline to start two-way flows October 1," August 30, 2019, https://www.spglobal.com/platts/en/market-insights/latest-news/oil/083019-buckeyes-laurel-oil-product-pipeline-to-start-two-way-flows-october-1.

[79] Guttman Energy, Inc., d/b/a Guttman Oil Company, and PBF Holding Company LLC v. Buckeye Pipe Line Company, L.P. and Laurel Pipe Line Company, L.P., Docket Nos. OR14-4-000, OR14-4-001, Exhibits GP-98 and GP-117.

refined products solely from Buckeye Pipeline.[80] Additionally, most refineries have bulk terminals attached with the refinery typically being the sole supply source.

IV. Pennsylvania's Gasoline Markets

Mr. Burke, the Plaintiff expert witness on "Manufacture, distribution, storage, and marketing of gasoline in the relevant geographic area,"[81] presents his views as to whether Defendant firms supplied MTBE to "the Pennsylvania market."[82] For example, after citing details of three purchases of MTBE by American Refining Group, Mr. Burke states, "I conclude that it is likely that the American Refining Group supplied MTBE gasoline to *the Pennsylvania market*."[83] (italics added). However, all of Mr. Burke's references to "the Pennsylvania market" share a fundamental flaw: there is no "Pennsylvania market." Rather, as discussed below, Pennsylvania contains multiple distinct gasoline markets – "geographic markets" in the Economics vernacular.

[80] Guttman Energy, Inc., d/b/a Guttman Oil Company, and PBF Holding Company LLC v. Buckeye Pipe Line Company, L.P. and Laurel Pipe Line Company, L.P., Docket Nos. OR14-4-000, OR14-4-001, Exhibits GP-98 and GP-117.

[81] Letter from Tracey O'Reilly, "Plaintiff Commonwealth of Pennsylvania's Disclosure of Non-Site Specific Experts," *Commonwealth of Pennsylvania, etc. v. Exxon Mobil Corporation, et al, No. 1:14-cv-06228*, February 16, 2021, p. 2.

[82] Burke Report, ¶¶ 106-125.

[83] Burke Report, ¶ 107. Mr. Burke repeats this opinion, using similar language, for other Defendants.

A. Relevance of Economic Markets in this Proceeding

"Market definition," an important initial step in many types of economic analysis,[84] involves determining the boundaries within which firms compete. These boundaries can be geographic, in which case the markets are called "geographic markets," or they can be based on the characteristics of the products involved, in which case the markets are called "product markets," with "competitors" defined as suppliers that serve the same geographic market and the same product market. For example, two service stations will naturally be in the same product market (retail gasoline sales), so whether they are competitors depends on whether they are in the same geographic market. Another example is an inbound refined products pipeline and a service station supplied (indirectly) by the pipeline. The pipeline and the service station may serve the same geographic market, but they are not competitors because they serve different product markets (refined products transportation and retail gasoline sales, respectively).

In the context of the gasoline supply chain, the following criteria are applicable:

- A "geographic market" is a geographic area within which a common set of supply alternatives compete to supply gasoline to retail service stations or retail stations compete for consumers. In this criterion, the "supply alternatives" could be pipelines, waterborne transport, trucks, or rail facilities that can economically bring gasoline into

[84] For example, market definition (1) helps specify the product and geography, and (2) allows identification of market participants in the consideration by the U.S. Department of Justice and the Federal Trade Commission of whether to allow a merger of two competitors. U.S. Department of Justice and the Federal Trade Commission, "Horizontal Merger Guidelines," August 19, 2010, https://www.justice.gov/sites/default/files/atr/legacy/2010/08/19/hmg-2010.pdf, pp. 7-8.

the market or they could be refineries located within the market or sufficiently close by to economically supply the market using truck deliveries.

- A "product market" is a set of products (which could be either services or physical goods) that customers view as substitutes for each other.[85] For example, regular and premium gasoline, although they are different products chemically, would likely be in the same product market because either type can be used in most cars and a substantial number of drivers will likely select one over the other based on price. To a large degree, different tiers of the gasoline supply chain compete in distinct product markets; for example, the "inbound refined products transportation services" product market would include all of the pipelines and waterborne alternatives bringing gasoline into Pennsylvania's geographic markets.

In the present proceeding, geographic markets are particularly relevant because different geographic markets will likely be supplied by different sets of suppliers. Thus, (1) documentation that certain defendants supplied MTBE or MTBE gasoline to one geographic market does not indicate that those defendants supplied other (let alone all) geographic markets, and (2) the volume and market share of MTBE or MTBE gasoline supplied by a given Defendant (if any) will vary across the different geographic markets in Pennsylvania.

[85] More formally, products that exhibit cross-elasticity of demand. U.S. Department of Justice and the Federal Trade Commission, "Horizontal Merger Guidelines," August 19, 2010, https://www.justice.gov/sites/default/files/atr/legacy/2010/08/19/hmg-2010.pdf, p. 7.

B. Pennsylvania Contains Multiple Geographic Markets for Refined Products

On multiple occasions dating back to 1986, the DOJ and the Federal Energy Regulatory Commission ("FERC") defined and analyzed geographic markets in Pennsylvania for the purposes of determining the degree to which the rates charged by refined product pipelines delivering gasoline into Pennsylvania and elsewhere should be regulated. In all such cases, Pennsylvania was found to comprise multiple geographic markets.

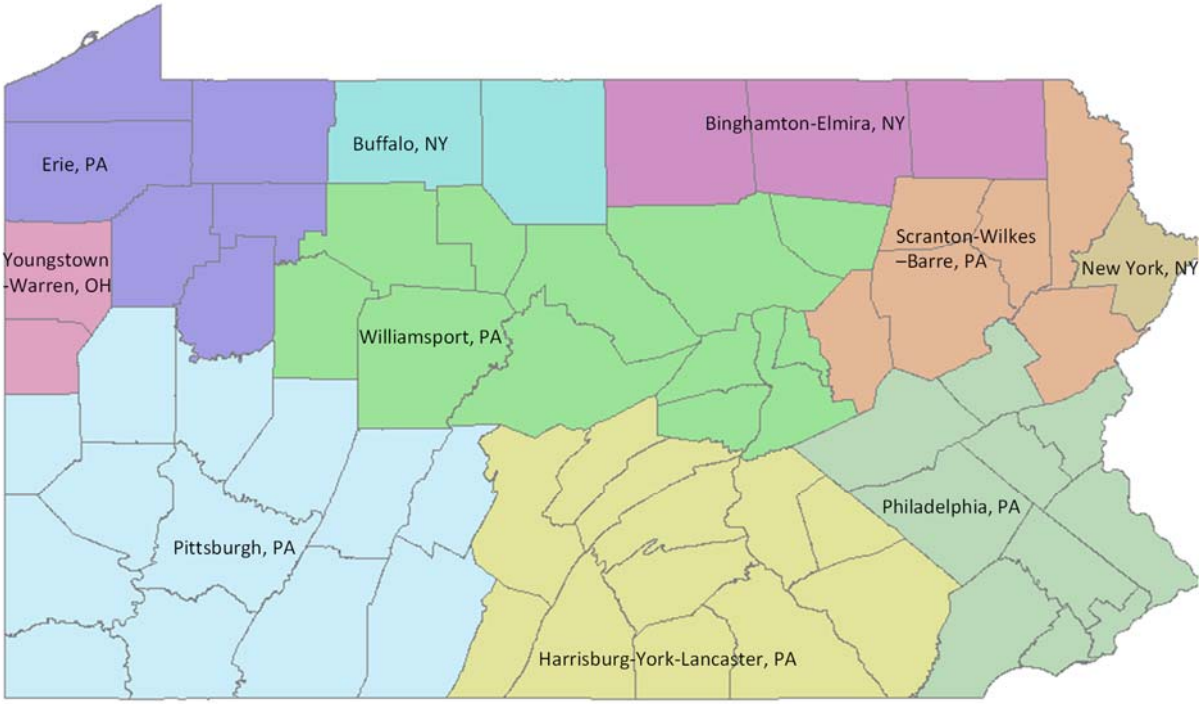
Pennsylvania's geographic markets for refined products were first analyzed by the DOJ in a 1986 *Oil Pipeline Deregulation* report.[86] In that report, the DOJ defined geographic markets throughout the U.S. as an initial step toward determining the appropriate degree of regulatory oversight to apply to interstate pipelines. The DOJ based its methodology for defining geographic markets on its guidelines for analyzing how markets are affected by proposed mergers between supplier firms.[87] The *Oil Pipeline Deregulation* report identified ten geographic markets in Pennsylvania, with some markets also including counties in neighboring states.[88] These markets, which are delineated by the counties they comprise and labelled by the largest city within, are shown in Figure 8 below.

[86] DOJ, "Oil Pipeline Deregulation," May 1986, https://www.ferc.gov/sites/default/files/2020-06/doj-report.pdf, pp. xi-xii, 20-23.

[87] DOJ, "Oil Pipeline Deregulation," May 1986, pp. xi-xii, 20-23; DOJ, "1984 Merger Guidelines," https://www.justice.gov/archives/atr/1984-merger-guidelines.

[88] DOJ, "Oil Pipeline Deregulation," May 1986, p. 22 is a map delineating the geographic markets considered in the DOJ report.

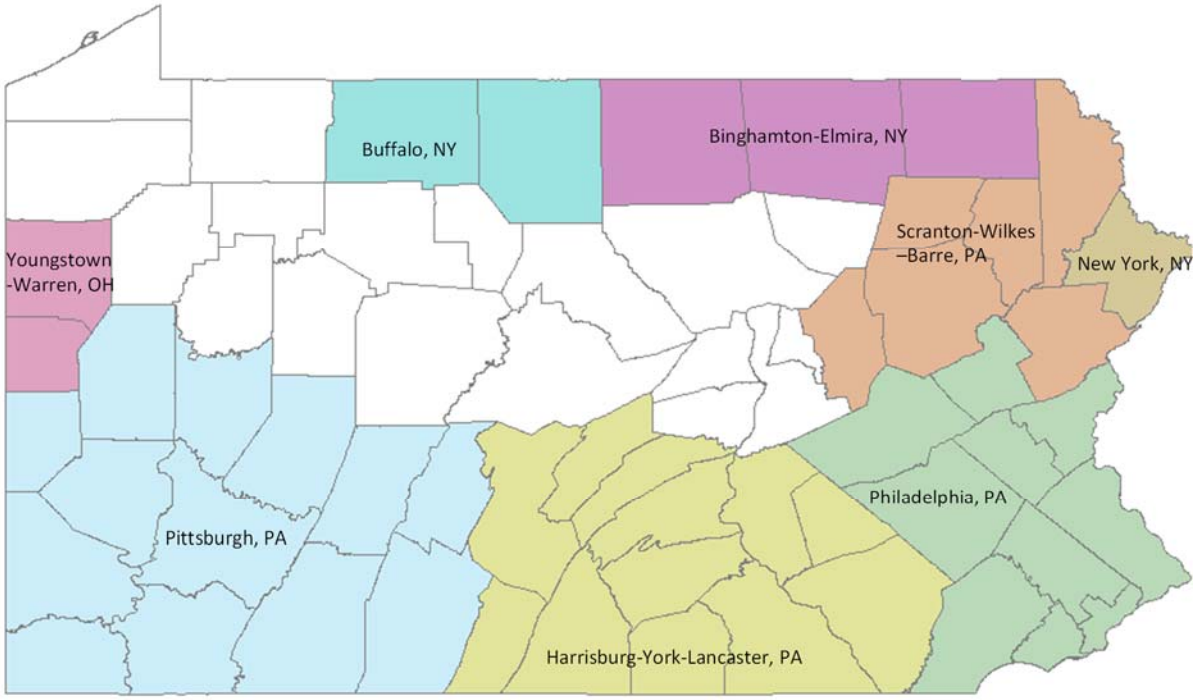
Figure 8
Pennsylvania Geographic Markets for Refined Products: DOJ 1986



The next assessment of Pennsylvania's refined product geographic markets occurred in a proceeding regarding Buckeye Pipeline Company, L.P.'s pipeline rates, on which the FERC issued an opinion in 1990.[89] The Pennsylvania geographic markets adopted in that opinion are shown in Figure 9 below. These market definitions coincide with the DOJ-defined markets shown in Figure 8 except that the Erie and Williamsport markets were not applicable to that proceeding and were not defined.

[89] In that proceeding, the FERC analyzed whether Buckeye had market power in the markets in which it operated, finding that "Buckeye did not have significant market power over a large portion of its markets … [and] that light-handed regulation was appropriate in those markets." Opinion No. 360, 53 FERC ¶ 61,473 (1990).

Figure 9
Pennsylvania Geographic Markets for Refined Products: FERC 1990



Over the decades following the DOJ and FERC analyses, other proceedings identified geographic markets for refined products in Pennsylvania similar to those accepted in the earlier analyses. In 2001, the FERC adopted a selection of counties surrounding Philadelphia as the geographic market that was relevant to refined product deliveries by Colonial Pipeline Company.[90] In 2007, the parties in a proceeding involving Sunoco Pipeline, L.P., identified geographic markets surrounding Harrisburg and Philadelphia as distinct markets.[91] Finally, in a challenge to the rates charged by Buckeye pipeline, the parties proposed, and the FERC affirmed, geographic

[90] *Colonial Pipeline Company*, 95 FERC ¶ 61,377 (2001).

[91] *Sunoco Pipeline, L.P.*, 118 FERC ¶ 61,266 (2007).

markets surrounding Pittsburgh, Harrisburg, and Philadelphia that were modified versions of the market definitions adopted by the FERC in 1990.[92]

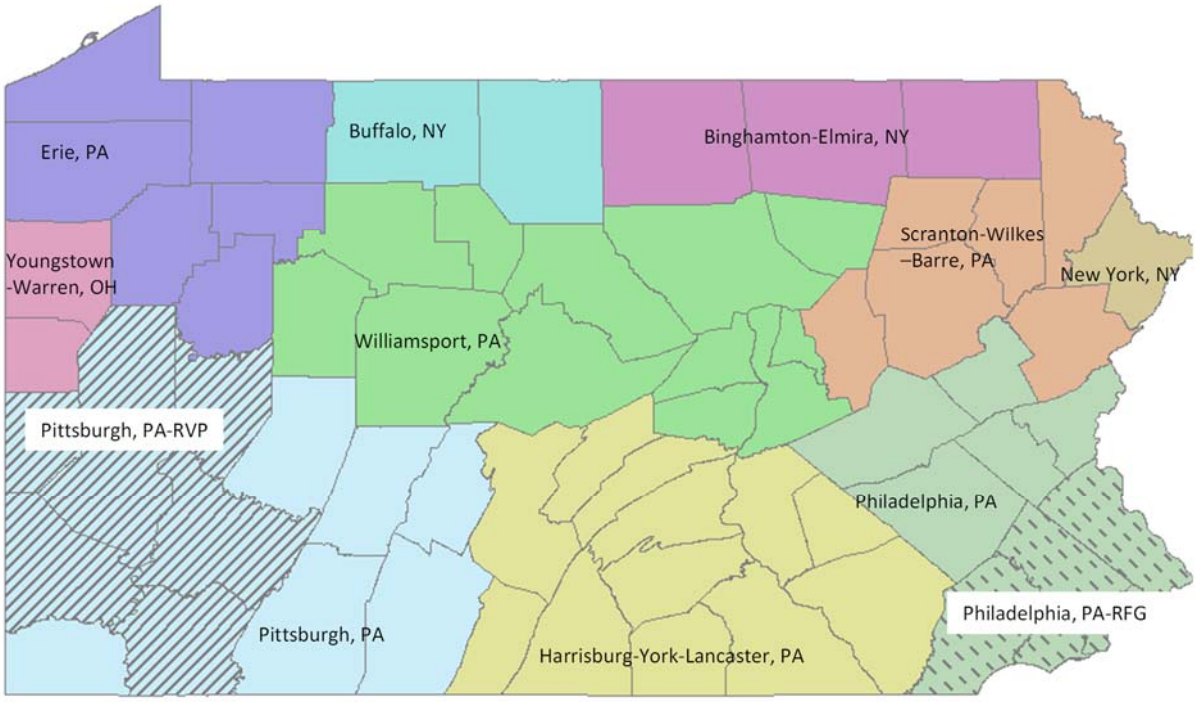
In addition to the geographic markets defined in these proceedings, Pennsylvania is partitioned by regulatory requirements to sell particular types of gasoline in certain areas. As described in Section III.B, in selected counties near Pittsburgh, the RVP of gasoline is restricted to 7.8 in certain months while RVP 9.0 gasoline can be sold elsewhere in the state. In addition, regulations in effect since 1995 mandate the sale of RFG in certain counties. Figure 10 below shows the areas in which these regulations apply.

[92] *Buckeye Pipe Line Company, L.P.*, 161 FERC ¶ 61,180, at pp. 83-97.

Figure 10
Pennsylvania RFG and Low-RVP Areas

The combination of the geographic markets (as adopted by the FERC in 1990) and the RVP and RFG restrictions effective in selected Pennsylvania counties are shown in Figure 11 below. In other words, the figure below shows different combinations of ways in which sales of gasoline in Pennsylvania are partitioned. Not only is Pennsylvania partitioned into several distinct markets, but within those markets, the sale of particular types of gasoline is required in some areas but not others. Thus, the economics and logistics of gasoline production and distribution for sale in Pennsylvania varies in different areas of the state, and any reasonable assessment of gasoline distribution within Pennsylvania must consider those geographic differences.

Figure 11
Pennsylvania Geographic Markets with RFG and Low-RVP Areas



V. Assessment of Mr. Burke's Opinions Regarding the Prevalence of Defendants', Manufacturers', and Suppliers' MTBE-Gasoline in Pennsylvania MTBE Releases

Mr. Burke proffers highly generalized opinions about the supply of gasoline to PADD 1 and Pennsylvania that entirely rely on the fact that some commingling of fungible gasoline is performed within parts of the gasoline supply chain. As I discuss below, these opinions are factually unsupported and over-generalized to the point of being incorrect.

One such opinion relates to all of PADD 1, which comprises Pennsylvania and 16 other states plus the District of Columbia. Mr. Burke states,

> I am of the opinion that, over time, any supplier of fungible gasoline into the PADD 1 gasoline supply system, which includes the State of Pennsylvania, will have, on average, supplied gasoline throughout the entire supply system.[93]

Other opinions refer to the "overall system that supplies Pennsylvania." Mr. Burke opines,

> [I]t is more likely than not that, over time, gasoline produced by any manufacturer that supplied MTBE-gasoline into the overall system that supplies the State of Pennsylvania also supplied the State of Pennsylvania with MTBE-gasoline.[94]

Mr. Burke then continues, with reference to "Defendant's MTBE-gasoline,"[95]

> [I]t is more likely than not that Defendant's MTBE-gasoline was released in the State of Pennsylvania, that any particular release contains multiple Defendants' gasoline, that it is impossible to tell from any chemical or other characteristic who manufactured the gasoline in any particular release, and that for the Defendants that supplied MTBE gasoline into the gasoline distribution system that supplied the State of Pennsylvania, since leaks typically take place over extended periods of time, it is a virtual certainty that for major gasoline suppliers that their MTBE-gasoline is present in any release that occurred while they were doing that supplying. The fact that Defendants did not have title to the gasoline delivered to the State of Pennsylvania or did not know that it was delivered to the State of Pennsylvania would not change the validity of this conclusion.[96]

However, Mr. Burke does not define his ""Defendant's MTBE-gasoline" term (and neither is it a term of art), and this vagueness renders his opinion meaningless.

Moreover, for a "Defendant's MTBE-gasoline" to contribute to a given MTBE release, the gasoline must have been present at the release site during the time frame in which the release

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[93] Burke Report, ¶ 102.

[94] Burke Report, ¶ 127.

[95] In the parlance of the petroleum industry, a "Defendant's MTBE-gasoline" would ordinarily mean the Defendant holds title to the gasoline, but it Is unclear whether Mr. Burke uses the term in that manner.

[96] Burke Report, ¶ 127. Similarly, *see* Burke Report, ¶¶ 8 and 101-102.

occurred. However, Mr. Burke does not base his opinions on an analysis of when or where "Defendant's MTBE-gasoline" was present at specific MTBE release sites in Pennsylvania. Additionally, there are five factors, discussed below with examples given, that undermine the applicability of Mr. Burke's opinions.

A. Factors Undermining the Applicability of Mr. Burke's Opinion

The first factor is the extent of commingling occurring within the gasoline supply chain supplying Pennsylvania. Mr. Burke discusses the concept of commingling, but he fails to recognize that there are substantial limitations to the commingling of the gasoline distributed to retail gasoline stations in PADD 1 and Pennsylvania. Mr. Burke's opinions are effectively contingent on complete commingling occurring throughout the gasoline supply chain that produces, transports, and distributes gasoline into PADD 1 and Pennsylvania,[97] so the limitations on commingling undermine the applicability of his opinions.[98]

The second factor is the degree to which gasoline is transported between different geographic areas. Mr. Burke asserts that any supplier of gasoline to any location along the East Coast of the U.S. (PADD 1) would have supplied the entirety of the East Coast.[99] However, Mr. Burke's assertion is unrealistic given the size of this area and the fact that the available transportation

[97] Mr. Burke prefaces his conclusions with the following: "[B]ecause gasoline supplied to the State of Pennsylvania has been repeatedly commingled from multiple sources and at multiple locations from the point of manufacture (refineries) through receiving tanks, pipelines, barges, distribution terminals, product terminals, and in the trucks that deliver to retail service stations, …".Burke Report, ¶ 127.

[98] All quotations in these examples refer to Burke Report, ¶¶ 102 and 127.

[99] Burke Report, ¶ 102 ("any supplier of fungible gasoline into the PADD 1 gasoline supply system, …, will have, on average, supplied gasoline throughout the entire supply system").

infrastructure constrains the degree to which gasoline from one part of PADD 1 or Pennsylvania can be economically transported to other parts. Moreover, because Pennsylvania contains multiple markets (and PADD 1 even more so), each "Defendant's MTBE-gasoline" cannot be assumed (as Mr. Burke does) to have ever been present in every geographic area simply because it was present somewhere in Pennsylvania or somewhere in PADD 1.

The third factor is the way individual retail stations are supplied because different retail stations, even if they are in the same market, may be supplied from different bulk terminals and may hold different "Defendant's MTBE gasoline" (or none). For example, a bulk terminal supplied by barge may hold completely different "Defendant's MTBE-gasoline" than a bulk terminal supplied by pipeline. Similarly, a bulk terminal connected to a refinery (such as at any of Pennsylvania's refineries) may not hold any "Defendant's MTBE-gasoline" except what was produced in the refinery. Thus, a "Defendant's MTBE-gasoline" cannot be assumed to have contributed to a given MTBE release simply because the "Defendant's MTBE-gasoline" was present at some terminal in the vicinity of the MTBE release.

The fourth factor is the gasoline involved. Different types of gasoline are used in different parts of PADD 1 and Pennsylvania, and a "Defendant's MTBE-gasoline" cannot contribute to an MTBE release if it is a different gasoline type than what was released. Thus, a given "Defendant's MTBE-gasoline" cannot be assumed to have contributed to a MTBE release simply because *some type* of the "Defendant's MTBE-gasoline" was present at the release site.

The fifth factor is time. Because of the movement or "throughput" of gasoline through the gasoline supply chain, any "Defendant's MTBE gasoline" at a given location will quickly dissipate

to zero unless new volumes of the "Defendant's MTBE gasoline" are frequently introduced to that location. Therefore, a "Defendant's MTBE gasoline" can only contribute to an MTBE release if it is introduced to the release site during the immediate time frame in which the release occurred. However, the gasoline supply patterns varied over time as evidenced by changes in the ownership and usage of the refineries, pipelines, bulk terminals, retail stations, and other assets that make up the Pennsylvania gasoline supply chain. The gasoline supply patterns also varied over time as the mix of firms to/from which the involved firms sold and bought gasoline. Thus, it cannot be assumed that a given "Defendant's MTBE gasoline" contributed to an MTBE release without regard to the timing of the release vis-a-vis the presence of the "Defendant's MTBE gasoline" at the release site.

Below are 12 examples illustrating the extent of these limitations in Pennsylvania and PADD 1:[100]

1. "[T]he overall system that supplies the State of Pennsylvania" referred to by Mr. Burke[101] includes the network of refineries, pipelines, terminals, and other assets that is located across the U.S. Midwest and connected to Pennsylvania by pipelines, trucks, and barges entering Pennsylvania from the west. However, connections to Western Pennsylvania from this portion of "[T]he overall system that supplies the State of Pennsylvania" do not extend beyond Western Pennsylvania. Thus, there are no economic means for transporting gasoline imported into Western Pennsylvania from this "overall system" to Eastern

[100] All quotations in these examples refer to Burke Report, ¶¶ 102 and 127.

[101] Burke Report, ¶ 127.

Pennsylvania or to more distant parts of PADD 1. For example, testimony filed in regulatory matters going back to 1988 document that the markets surrounding Harrisburg and Philadelphia in Eastern Pennsylvania were supplied from the east and south, but not from the west.[102]

2. The "[suppliers] of fungible gasoline into the PADD 1 gasoline supply system" referred to by Mr. Burke[103] includes firms – some of which are in other countries – that bring gasoline into PADD 1 through numerous Eastern Seaboard docks that are not connected to outbound pipelines. For example, most of the Eastern Seaboard north of New York Harbor (*e.g.,* the Port of Providence, Rhode Island) and south of Virginia is supplied by water and is not connected by pipeline to Pennsylvania and the rest of PADD 1. Thus, there are no economic means for transporting those volumes overland to Pennsylvania and other distant parts of PADD 1.
3. Pennsylvania and PADD 1 are not "fully connected" by pipeline, which limits transportation of gasoline between locations. For example, there are no refined products pipelines serving the Northwest Pennsylvania area in which United Refining Company's ("URC's") refinery is located.[104] Without an attached outbound pipeline from United's refinery, the gasoline

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[102] Direct Answering Testimony of Dr. Jonathan D. Ogur, February 6, 1989, in FERC Docket IS87-14-000, Exhibit S-7 showing, for example, that the transportation alternatives for the Harrisburg market were three pipelines from the east (Buckeye, Atlantic, and Mobil pipelines) and potentially also truck deliveries from the Baltimore and Philadelphia areas. Though this material is marked as "Privileged, Do Not Release" all material in this matter was made public by FERC order. FERC ALJ Order 48 FERC ¶ 63,005 (1989).

[103] Burke Report, ¶ 102.

[104] This constraint also applies to the Pennzoil refinery in Rouseville, Pennsylvania, (closed in 2001) and the American Refining Group refinery in Bradford, Pennsylvania, for the gasoline those refineries (both in Northwest

produced there is distributed exclusively by truck to surrounding areas of Pennsylvania, New York, and Ohio and not to more distant areas of Pennsylvania and PADD 1.[105] Thus, URC's branded stations or affiliate-operated stations near that refinery are typically supplied directly from the refinery, and United did not deliver gasoline to any terminals in Pennsylvania.[106]

4. Most, if not all, of the U.S. Gulf Coast refineries, as well as other U.S. refineries with direct access to waterborne transport, are attached to docks that are not shared with other refineries. Gasoline transported by water from these refineries is typically segregated, not commingled, during transport.

5. Terminals affiliated with refiners are frequently operated as proprietary terminals that only distribute gasoline from the affiliated refinery, especially for terminals attached to refineries. Examples of terminals attached to affiliate refineries are the truck racks at United Refining Company's refinery in Warren, Pennsylvania and ConocoPhillips' "G-Street" terminal in Philadelphia.[107]

6. Different types of gasoline are segregated during transport, storage, and distribution. Examples include: (1) reformulated gasoline, conventional gasoline, low-RVP gasoline; (2)

Pennsylvania) produced in addition to their lubricants production. Declaration of Pennzoil-Quaker State Company Pursuant to CMO 4(III)(B)(2), including Exhibit A which indicates customer addresses that are exclusively in Western Pennsylvania; American Refining Group, "Our products," https://www.amref.com/products/.

[105] Deposition of Roy Andrew Williams, September 24, 2020, pp. 98-99, 165-166; Deposition of Richard Dean Stanton, September 24, 2020, pp. 42, 45-46, and 149.

[106] Deposition of Roy Andrew Williams, September 24, 2020, pp. 28-31; Deposition of Richard Dean Stanton, September 24, 2020, pp. 143-144.

[107] Deposition of Jolie Rhinehart, November 11, 2020, pp. 37-38, 186-187, 200.

gasolines with different octanes; and (3) non-fungible gasolines. For example, Sunoco's "Ultra" gasoline, primarily produced at the Marcus Hook refinery,[108] was segregated from refinery to retail station until at least 2004 due to its high octane.[109] Another example is "Super Kwik" gasoline containing MTBE produced at the United Refining Company refinery from 1986 to 1994. The "Super Kwik" gasoline was segregated at the refinery and distributed to only Kwik Fill stations.[110] Additionally, Amoco's "Crystal Clear" gasoline was shipped on pipelines in a segregated fashion (and was likely segregated at terminals as well[111]) and Colonial pipeline transports segregated batches when requested by customers.[112]

7. Mr. Burke repeatedly cites volumes tendered on Colonial pipeline at the U.S. Gulf Coast together with commingling within the Colonial pipeline system, as evidence that "Defendant's MTBE gasoline" is present in MTBE releases throughout Pennsylvania.[113] However, the extent to which Colonial pipeline delivered MTBE gasoline into Pennsylvania is limited by the fact that Colonial pipeline delivers only small volumes of RFG to Pennsylvania

[108] Small amounts of the "Ultra" gasoline – approximately one tanker truck per day on average, or less – were also blended under contract with United Refining Company. Deposition of Richard Dean Stanton, September 24, 2020, Exhibit 1. As with other gasoline produced in the United Refining Company refinery in Warren, Pennsylvania, some or most of these "Ultra" volumes were likely distributed to New York and Ohio.

[109] Deposition of David Tropp (in New Hampshire case), November 4, 2010, pp. 47-51, 78-79, and 106-107.

[110] Deposition of Roy Williams, September 24-25, pp. 57-59; and Deposition of Richard Dean Stanton, September 24, 2020, Exhibit 1; pp. 67-68.

[111] Declaration of James J. Simnick, December 22, 2015, ¶ 28.

[112] Deposition of James Edward Brown in County of Suffolk and Suffolk County Water Authority v. Amerada Hess Corp., et al., January 18, 2008, pp. 65 ("if you did not want your product commingled with any other product, you would ship that product as a segregated batch on the Colonial system."

[113] *See, e.g.,* Burke Report, ¶¶ 97-98, 108, 110, 111, 115, 116, 121, 128-136, 138, 140-143, 146.

and primarily transports RFG away from Pennsylvania.[114] For example, although ConocoPhillips operated refineries in the Gulf Coast, it did not transport gasoline from those refineries to Pennsylvania via Colonial.[115] Additionally, Colonial pipeline was not connected to portions of the Buckeye pipeline system until 2013.[116] Thus, the mere fact that volumes of MTBE gasoline are tendered on Colonial pipeline does not imply that Colonial-transported MTBE gasoline is present at MTBE release sites throughout Pennsylvania.

8. The identities of the firms manufacturing and distributing the gasoline sold in Pennsylvania changed over time due to the changing ownership of refineries, terminals, retail stations, and other assets. For example, Exhibit 9B shows changes in the ownership of refineries in Pennsylvania and adjacent states from 1979 to 2006. ConocoPhillips' refinery in Trainer, Pennsylvania is a more specific example. This refinery was purchased by Tosco Refining Co. in 1996 and thereafter acquired by ConocoPhillips in 2001. Since at least the acquisition by Tosco, that refinery only used MTBE in RFG, not in conventional gasoline or other oxygenated gasolines, and only distributed this RFG in Eastern Pennsylvania.[117]

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[114] Email from Brian Trowbridge to Libby Dodson, February 24, 2006 (CMW-PA-0010800) ("The vast majority of PA RFG comes from our local PA and NJ refineries and take little product from Colonial. In fact those refineries mostly inject into Colonial for shipment to New England."). I understand that both Brian Trowbridge and Libby Dodson were from the Pennsylvania Department of Environmental Protection.

[115] Deposition of Jolie Rhinehart, November 11, 2020, pp. 35-38.

[116] "Shipments are due to begin this month via a new connection between Colonial Pipeline and Buckeye Pipe Line that enables Gulf Coast refineries to supply eastern Pennsylvania and upstate New York via pipeline." Colonial Pipeline Company, "Colonial-Buckeye Connection Benefits Pennsylvania And New York Markets," February 11, 2013, https://www.colpipe.com/news/press-releases/colonial-buckeye-connection-benefits-pennsylvania-and-new-york-markets; Colonial Pipeline Company, "Press Releases," https://www.colpipe.com/news-media/p16, (indicating publication date).

[117] Deposition of Jolie Rhinehart, November 11, 2020, pp. 46-47 (*e.g.*, "Reformulated gasoline that contained MTBE was sold from the Trainer facility from about May of 1997 until 7 April 2006, that is correct. And that is the only

9. Within pipelines, the identity of the shippers contributing volumes to individual batches of gasoline changes over time. For example, Colonial pipeline schedules gasoline transportation in five-day cycles. In each cycle, Colonial transports "a sequence of all in-season products,"[118] and then repeats the cycle over the subsequent five days. The identity of the shippers contributing volumes will change over time because of different shippers nominating volumes for shipment in different cycles and due to Colonial's methodology for allocating pipeline space when nominations exceed capacity.

10. Mr. Burke essentially ignores the fact that the quantity, timing, and location of gasoline volumes refined and distributed by individual firms varied over time or was limited for other reasons. For example:

- Total Petrochemicals produced RFG, but only for one year (1995) and had only five transactions where a title transfer occurred in Pennsylvania.[119] Total Petrochemicals never refined or marketed petroleum products in Pennsylvania (*e.g.*, it did not own,

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reformulated gasoline grades -- during that time period, they were the only ones that contained MTBE.") and p. 73 (testifying that the refinery had no plant to deliver RFG to any counties in Western Pennsylvania, "We did not ship reformulated gasoline on the Laurel Pipeline, which is how we shipped barrels west.").

[118] *See, e.g.*, Colonial Pipeline Company, "Colonial Allocates Cycle 17 Shipments On Two Distillate Lines," https://www.colpipe.com/news/press-releases/colonial-allocates-cycle-17-shipments-on-two-distillate-lines. At some point prior to 2008, Colonial used ten-day cycles. Deposition of James Edward Brown in County of Suffolk and Suffolk County Water Authority v. Amerada Hess Corp., et al., January 18, 2008, pp. 78.

[119] Declaration of Total Petrochemicals & Refining USA, Inc. Pursuant to Section III.E of Case Management Order No. 119, pp. 1-2 ("From January 1995 to December 1995, Total manufactured reformulated gasoline ("RFG") containing MTBE at its Port Arthur, Texas refinery. Some of this RFG was shipped on the Colonial Pipeline, and five of those transactions had title transfer points in the Commonwealth of Pennsylvania. Those transactions, including the identities of Total's customers, are identified on a document Bates labeled TOTAL013049 that has been previously produced to Plaintiff. Total is not in possession of information regarding whether any of the RFG Total sold to customers with title transfer points in the Commonwealth of Pennsylvania was ultimately delivered to the Relevant Geographic Area.") *See also* Total Petrochemicals & Refining USA, Inc.'s Objections and Responses to Plaintiff's Amended First Set of Site-Specific Interrogatories to Defendants, pp. 1-2.

operate, or lease any branded retail stations in Pennsylvania, and is not aware of any wholesalers or jobbers in Pennsylvania to whom it supplied gasoline containing MTBE.).[120]

- Tosco was not involved in the supply of gasoline to Pennsylvania until 1997, when it began operating the Trainer refinery (following its acquisition in 1996). Tosco owned several hundred gas stations from 2000 to 2004.[121]

- Prior to 2005, Mobil was the sole user of a pipeline that flowed from the Paulsboro refinery west to Harrisburg, Pennsylvania[122] and north to Reading, Pennsylvania and then to New York, with several terminals along this pipeline (*e.g.,* the Lancaster, Pennsylvania, terminal) receiving product only from that pipeline. This changed in 2005 when the pipeline was sold to Buckeye and subsequently connected to another northbound Buckeye pipeline serving New York. Additionally, Mobil divested its retail and terminal assets in western Pennsylvania in the 1980s. In 1993, it sold terminals in

[120] Declaration of Total Petrochemicals & Refining USA, Inc. Pursuant to Section III.E of Case Management Order No. 119, pp. 5-6; Total Petrochemicals & Refining USA, Inc.'s Objections and Responses to Plaintiff's Amended First Set of Site-Specific Interrogatories to Defendants, pp. 1-2.

[121] Deposition of Jolie Rhinehart, November 11, 2020, pp. 37-38, 50-52, 195-196, 200-201.

[122] Source: Conversation with Mr. Al Kaberline of ExxonMobil. The pipeline and attached facilities are described in ExxonMobil Oil Corporation's Declaration in Response to CMOs 4 & 119, Subsection III(B)(2)(a)(ix)(3). *See also* Mobil Pipe Line Company, Supplement No. 2 to F.E.R.C. No. A-1127, effective July 1, 2004; and Carlyle Group Press Release, "Buckeye Partners, L.P. to Acquire Northeast Pipelines and Terminals from ExxonMobil," January 20, 2005, https://www.carlyle.com/media-room/news-release-archive/buckeye-partners-lp-acquire-northeast-pipelines-and-terminals.

eastern Pennsylvania, leaving it with just a few terminals in the Philadelphia area. Mobil divested all retail assets in Pennsylvania in 2000.[123]

- George E. Warren had only 1 or 2 trades per year involving RFG in Pennsylvania.[124]

- Hess owned retail stations in southeast and central Pennsylvania, but none in western Pennsylvania.[125]

- United Refining Company did not have any retail presence (branded or affiliate-operated stations) or gasoline distribution to the RFG areas in Southeastern Pennsylvania.[126]

- The only gasoline transported to Tosco's "G Street Racks" in Philadelphia was gasoline produced by Tosco's Trainer refinery (after Tosco began operating the Trainer refinery in 1996 or 1997). This gasoline would have been transported from the Trainer refinery to the Chelsea tank farm, which was a proprietary facility, and then via a proprietary pipeline to the G Street Racks. Additionally, conventional gasoline, including premium, produced by the Trainer refinery would not have contained MTBE as the gasoline

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[123] A consent order in 1999 required divestiture of these assets in 2000. United States of America before Federal Trade Commission, "Agreement Containing Consent Orders," November 30, 1999, pp. 29-33, https://www.ftc.gov/sites/default/files/documents/cases/1999/11/exxonmobilagr.pdf; Agreement of Purchase and Sale Between Sohio Oil Company and Mobil Oil Corporation, dated December 15, 1987.

[124] Spreadsheet with filename "George E. Warren spreadsheet1 .pdf" produced by George E. Warren defendants.

[125] Defendant Hess Corporation's Objections and Responses to Plaintiff's First Set of Special Interrogatories, at Response to Interrogatory 11.

[126] Deposition of Roy Andrew Williams, September 24, 2020, pp. 48-52; Exhibits 22-24; Defendant United Refining Company's Second Supplemental and Amended Responses and Objections to Plaintiff Commonwealth of Pennsylvania's First Set of Special Interrogatories, at Response to Interrogatory No. 11.

produced by the Trainer refinery had excess octane, and thus did not need for MTBE added to meet octane specifications.[127]

11. Even for the commingled volumes on which Mr. Burke's opinions are contingent (such as the volumes moving through a pipeline or resting within tankage) the mixtures of "Defendant's MTBE gasoline" is not static and will vary over time. Specifically, the identity of the firms either holding title to the gasoline or that manufactured the gasoline will vary over time and between batches.

12. Mr. Burke makes no distinction between the five Pennsylvania counties in which RFG was required ("RFG counties") and the rest of the state. However, to the limited extent that MTBE was used in gasoline outside of those five counties, the identities of the firms producing and/or distributing MTBE gasoline would be different and more limited than within the RFG counties. For example, the ConocoPhillips defendants distributed MTBE gasoline in the RFG counties, but not in the rest of Pennsylvania.[128]

B. Data Ignored by Mr. Burke

Mr. Burke, in his opinions regarding the prevalence of Defendants', manufacturers', and suppliers' MTBE-Gasoline in Pennsylvania MTBE Releases presents no analysis or consideration of whether it is possible to identify specific firms such as refiners, terminal operators,

[127] Discussion with Jolie Rhinehart of ConocoPhillips, April 29, 2021.

[128] Deposition of Jolie Rhinehart, November 11, 2020, p. 194-5 ("we don't have any evidence to suggest that we sold gasoline that was containing MTBE, reformulated gasoline that contained MTBE, or low RVP gasoline to any county where it was not required to do so," and "we did not ship any reformulated gasoline that contained MTBE out the Laurel Pipeline; and that in the state of Pennsylvania, the only terminal we supplied with MTBE-containing RFG was in G Street [in Philadelphia].").

wholesalers, and transportation providers that supplied specific MTBE release sites, terminals, markets within Pennsylvania, or other locations. Instead, Mr. Burke effectively just assumes it is impossible to determine which locations were supplied by which firms, and, by doing so, he ignores the fact that detailed data about gasoline movements and transactions were collected by the involved firms for accounting and operational purposes. This data, when aggregated across firms involved a given movement of gasoline from refinery to retail station, would in many cases document the firm that refined the gasoline as well as the parties that held title to it at all times between the refinery and the retail station.

Defendants in this litigation have produced substantial amounts of historical data of this type. For example:

1. BP identified "active direct supply retail sites" as of December 3, 2004.[129]
2. CITGO produced data on gasoline volumes lifted from terminals by customers who reported a Pennsylvania destination, including source terminal, month, product, and customer for 1999 to 2006.[130]
3. ConocoPhillips produced data on movements to Pennsylvania destinations by origin point, product description, customer name, and the type of transportation (truck/barge).[131]

[129] Deposition of James John Simnick, Ph.D., August 19, 2020, Exhibit 2; BP-MTBE-PA 00000084.

[130] CITGO-PA 001972.xlsx.

[131] Deposition of Jolie Rhinehart, November 11, 2020, Exhibit 4.

4. Cumberland Farms, Inc. produced gasoline sales data by source terminal, station destination, product, and date for 1992 to 2006.[132]
5. Gulf Oil produced gasoline sales data by source terminal, station destination, product, and date for 1992-1994 and 1997.[133]
6. ExxonMobil produced detailed data for 1985 to 2006 regarding gasoline sales from terminals that supplied product to retail locations in Pennsylvania, including product and customer information.[134]
7. Hess produced data on gasoline shipments into Pennsylvania from 1997 to 2007 by month, product, source terminal, and destination station.[135]
8. Sunoco produced detailed sales data by product and customer with source terminal, and station ship to and bill to locations indicated, for 1984 to 2006.[136]

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[132] PAMDL1358CFI-0059922.xlsx, PAMDL1358CFI-0059924.xlsx, PAMDL1358CFI-0059925.xls

[133] PAMDL1358GOLP-0011676.XLS.

[134] Letters to Michael Axline, June 16, 2015, August 6, 2015, referencing several data sets.

[135] HESS-PA-0037356_gasoline deliveries PA 1999-2007.xlsx.

[136] 2015-08-25 Column Heading Key for Sunoco, Inc. (R&M) PA Sales Data Produced August 17, 2015.PDF;
Sunoco PA Gasoline Sales Data 1984 - 1985.xlsx;
Sunoco PA Gasoline Sales Data 1986 - 1987.xlsx;
Sunoco PA Gasoline Sales Data 1988 - 1989.xlsx;
Sunoco PA Gasoline Sales Data 1990.xlsx;
Sunoco PA Gasoline Sales Data 1991 (Jan - June).xlsx;
Sunoco PA Gasoline Sales Data 1991 (July - Dec).xlsx;
Sunoco PA Gasoline Sales Data 1992 (Jan - June) resent on 2015-08-26.xlsx;
Sunoco PA Gasoline Sales Data 1992 (Jan - June).xlsx;
Sunoco PA Gasoline Sales Data 1992 (July - Dec).xlsx;
Sunoco PA Gasoline Sales Data 1993 (Jan - June).xlsx;
Sunoco PA Gasoline Sales Data 1993 (July - Dec).xlsx;
Sunoco PA Gasoline Sales Data 1994.xlsx;
Sunoco PA Gasoline Sales Data 1995.xlsx;
Sunoco PA Gasoline Sales Data 1996.xlsx;

9. United Refining Company produced data on sales from third-party terminals for 2000 to 2006 and refinery sales for 2000 by customer bill to and, often, ship to location, product, and date.[137]
10. Chevron produced data indicating where in Pennsylvania it delivered gasoline containing MTBE between 1992 and 1994.[138]

Below are several examples of how data of this type, collected in the ordinary course of business, can be informative about how specific retail stations were supplied:

- **Retail station at 3607 West Chester Pike, Newtown Square**: This is a Sunoco-owned, dealer operated site. The site was supplied from the Malvern terminal in 1992-2006, Exton in 1990-1991, Belmont in 1991-1992, 1996, and 2004-2006, Twin Oaks in 1991-1992, 1994, 1996, and 2003-2006, and Willow Grove in 2003-2006.[139] Upstream at the relevant times: Malvern was supplied from what is now the Sunoco pipeline system; Exton was supplied from a private pipeline owned by Sun Company, Inc. ("Sun," a predecessor to Sunoco[140]) which was attached to the Atlantic Pipeline (now part of the Sunoco pipeline system); Belmont was supplied from Sun's private pipeline, Atlantic

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Sunoco PA Gasoline Sales Data 1997.xlsx;
Sunoco PA Gasoline Sales Data 1998.xlsx;
Sunoco PA Gasoline Sales Data 1999 - 2000.xlsx;
Sunoco PA Gasoline Sales Data 2001 - 2002.xlsx;
Sunoco PA Gasoline Sales Data 2003 - 2004.xlsx;
Sunoco PA Gasoline Sales Data 2005 - 2006.xlsx.

[137] URC0011651 Terminal Sales.xlsx; URC0011652 Refinery Sales.xlsx

[138] Declaration of Robert A. Nocco, May 13, 2021, item number 8; also 28_CHEVMDL_PA_MTBE-0000000008.xlsx.

[139] Sunoco sales data, produced Aug. 27, 2015 (*see* File & ServeXpress Transaction No. 57726218).

[140] Sunoco, "About Us," https://www.sunoco.com/about-us.

Pipeline in 1991, 1992, and 1996, with two transfers from Buckeye Pipeline in 1996; Twin Oaks was supplied from a Sun private pipeline connection to the Marcus Hook refinery; and Willow Grove was supplied from the Sunoco pipeline system.[141]

- **Retail station at 4101 North Front Street, Harrisburg**: This site was Sunoco owned and lessee operated in 1989, Sunoco owned and dealer operated in 1994-1996, and owner operated in at least 1999-2000 and 2005-2006. The site was supplied from terminals in York during 1989 and Mechanicsburg during 1994-1996, 1999-2000, and 2005-2006. The site had one RFG delivery in December 1994.[142] Upstream at the relevant times, York and Mechanicsburg were supplied from what is now the Sunoco pipeline system.[143]

- **Kwik Fill "M2" retail station:** In site specific interrogatories in this matter, United Refining Company described a Kwik Fill station ("M2") that was owned and operated by an affiliate from 1979 until the station's sale and closure in 2006.[144] The source of the gasoline delivered to the station was the United refinery, except for rare instances where the station was supplied from third-party terminals.[145]

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[141] Sunoco data excerpts with representative entries identifying upstream sources of product supplied to relevant terminals.

[142] Sunoco sales data, produced Aug. 27, 2015 (*see* File & ServeXpress Transaction No. 57726218).

[143] Sunoco data excerpts with representative entries identifying upstream sources of product supplied to relevant terminals.

[144] Defendant United Refining Company's Responses and Objections to Plaintiff's Amended First Set of Site-Specific Interrogatories and Requests for Production of Documents, Interrogatories 10 and 11.

[145] "Information regarding deliveries of gasoline to Kwik Fill M2 is not reasonably accessible for the time period before January 6, 2000." Defendant United Refining Company's Responses and Objections to Plaintiff's Amended First Set of Site-Specific Interrogatories and Requests for Production of Documents, Interrogatories 10 and 11.

Two other issues are notable regarding the types of data discussed above. First, in addition to the data that has been produced (or could have been produced if requested), other data that would likely be informative about how MTBE release sites were supplied has been lost over the passage of time. For example, defendant TRMI-H LLC ("TRMI") answered a set of interrogatories in part by noting that while TRMI refined and marketed gasoline in the U.S. starting in 1985, it ceased doing so in December 1988.[146] TRMI states, "As a result of this divestiture, and the passage of time*, TRMI is no longer in possession of much of the historical information sought by these discovery requests*."[147] (italics added)

Second, this data is inconsistent with and does not support Mr. Burke's opinions. Specifically, the data that I reviewed, which includes all the data sets listed above, contradicts Mr. Burke's view that "any supplier of fungible gasoline into the PADD 1 gasoline supply system, which includes the State of Pennsylvania, will have, on average, supplied gasoline throughout the entire supply system."[148] Instead, the data indicates that the bulk terminals, retail stations, and other locations involved in gasoline distribution were each supplied by a finite and discrete set of suppliers that varied over time.

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[146] Defendant TRMI-H LLC's Objections and Responses to Plaintiff's 6th Set of Special Interrogatories and Requests for Production to Defendants Regarding Market Share, p. 1.

[147] *Ibid.*

[148] Burke Report, ¶ 102.

C. Conclusions

Regarding the manufacturing and distribution of MTBE gasoline in Petroleum Administration for Defense District (PADD) 1 and Pennsylvania, I have reached three primary conclusions.

First, contrary to Mr. Burke's numerous references to "the Pennsylvania market," [149] Pennsylvania comprises numerous distinct markets (discussed in Section IV above), including distinct "geographic markets," that are supplied by different combinations of industry participants (e.g., refiners, wholesalers, terminal owners/operators, traders, and jobbers) and gasoline transportation alternatives (pipelines, rail, barges, and trucks) and/or that use different types of gasoline.

Second, as discussed above in this section of my report, Mr. Burke's opinions regarding the distribution of MTBE gasoline in PADD[150] 1 and Pennsylvania[151] are overly generalized to the point of being incorrect. That is, while Mr. Burke's opinions may apply to some firms in some locations at some points in time, they do not apply to "any supplier of fungible gasoline into the PADD 1 gasoline supply system"[152] or "any manufacturer that supplied MTBE-gasoline into the overall system that supplies the State of Pennsylvania" at all points in time.[153]

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[149] Burke Report, ¶ 107.

[150] "The Petroleum Administration for Defense Districts (PADDs) are geographic aggregations of the 50 States and the District of Columbia into five districts: PADD 1 is the East Coast, PADD 2 the Midwest, PADD 3 the Gulf Coast, PADD 4 the Rocky Mountain Region, and PADD 5 the West Coast." EIA, "PADD regions enable regional analysis of petroleum product supply and movements," February 7, 2012, https://www.eia.gov/todayinenergy/detail.php?id=4890.

[151] Burke Report, ¶ 127.

[152] Burke Report, ¶ 102.

[153] Burke Report, ¶127.

Third, the identity of the firms that produced and distributed the MTBE gasoline placed into underground storage tanks and other inventory points in Pennsylvania (many of whom are not defendants in this litigation) varied by location and over time as did the volume and MTBE-concentration of the MTBE gasoline produced or distributed by those firms and transported to those locations. Further, due to the numerous distinct markets in Pennsylvania, the large numbers of firms that produce and distribute gasoline, the configuration and limitations of the U.S. gasoline supply chain (including in and around Pennsylvania) and the numerous refineries and transportation routes by which gasoline enters Pennsylvania, and other factors discussed herein, at no point in time would the MTBE gasoline found in any underground storage tank or inventory point in Pennsylvania have included contributions from every firm producing or distributing MTBE gasoline for sale in Pennsylvania at that time.

VI. Potential for Widespread Ethanol Usage in the U.S. Northeast

In this section, I consider whether widespread expansion of ethanol usage in the U.S. Northeast[154] could have occurred in the early 1990s to satisfy federal oxygenate requirements. The introduction of widespread ethanol usage in that area at that time would have been a major change to the existing gasoline supply chain (as it was when it occurred in the mid-2000s). It would have required "standing up" an ethanol-specific supply chain, and it would have required innumerable firms (such as refiners, pipelines, traders, marketers, terminal operators, storage operators, jobbers, and retailers) to make substantial modifications to their

[154] *I.e.*, Connecticut, Maine, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, and Vermont.

investment and introduced substantial complexity and numerous risks related to network effects, customer acceptance, ethanol supply and price, blendstock supply, reauthorization of governmental ethanol subsidies, exchanges, market concentration in the ethanol industry, contracting and counterparties, and availability of ethanol-specific infrastructure, facilities, and equipment.

Second, in complex production and distribution systems, major changes, especially if they entail significant investment, complexity, and risk, are not commercially viable without some form of mandate – typically, regulatory, financial, or operational – that induces the involved firms to individually choose to participate in the change. In the early 1990s, there was no mandate sufficient to lead gasoline industry participants to implement widespread ethanol usage in the U.S. Northeast. Consequently, widespread ethanol usage in that area was not commercially viable and did not occur. It only occurred when State restrictions on MTBE usage beginning in 2004 and the Renewable Fuels Standard beginning in 2005 created a regulatory mandate for ethanol usage. Therefore, it is unreasonable to believe that widespread ethanol usage in the U.S. Northeast could have happened in the U.S. Northeast in the early 1990s.

Scott Carr, Ph.D.
May 24, 2021